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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,602	08/04/2003	Anthony K. Stamper	FIS920030131US1	1601

32074 7590 06/18/2004

INTERNATIONAL BUSINESS MACHINES CORPORATION
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EXAMINER	
GURLEY, LYNNE ANN	
ART UNIT	**PAPER NUMBER**
2812	

DATE MAILED: 06/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/604,602	STAMPER ET AL.	
	Examiner	Art Unit	
	Lynne A. Gurley	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-52* is/are pending in the application.

4a) Of the above claim(s) *35-52* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

LYNNE A. GURLEY
PRIMARY PATENT EXAMINER
TC 2800, AU 2812

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8/4/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the amendment filed 3/29/04.

Currently, claims 1-52 are pending, claims 35-52 have been withdrawn.

Specification

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. The rejection of claims 1-8, 21 and 26 under 35 U.S.C. 102(b) as being anticipated by Grill et al. (US 6,413,852, dated 7/2/02) has been maintained for the reasons of record.

Grill shows the method as claimed in figures 1-5 with metal interconnect 185, first and third dielectrics 1110-140, and second insulator 220 in fig 1H and 270 in fig. 1N. A portion of the first insulator is left on the sidewalls of the metal interconnect (also fig. 5D).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. The rejection of claims 10-20, 22-25 and 27-34 under 35 U.S.C. 103(a) as being unpatentable over Grill et al. (US 6,413,852, dated 7/2/02) has been maintained for the reasons of record.

Grill shows the method substantially as claimed and as shown in the preceding paragraphs.

Grill lacks anticipation only in not teaching the specifics of a capping layer in the interconnects, the height of the interconnect vs. the dielectric being non-coplanar, the different etch rates and other details outside of the dielectric constants for the dielectric materials, some patterning details for the interconnect and the dielectric layers including isotropic etch to round corners and planarizing details.

It would have been obvious to one of ordinary skill in the art to have used the claimed parameters and planarization methods, rounded corner methods, etching methods and capping layers in the method of Grill, with the motivation that these methods are common to one of ordinary skill in the art.

Response to Arguments

8. Applicant's arguments filed 3/29/04 have been fully considered but they are not persuasive.

9. In response to Applicant's remarks, pages 3-4, regarding Applicant's statement that the opening in the Grill reference lacks being filled with a second dielectric layer, the Examiner holds the position that a second dielectric layer is shown by either the sacrificial place-holder (SPH) material 220 or, the air gap. Both material 220 and air are dielectrics (column 7, lines 54-67; column 8, lines 1-4) and, the claim does not preclude the dielectric being sacrificial, even at some point during the process.

10. In response to Applicant's remarks, pages 4-5, regarding Applicant's statement that the sidewalls of the conductive wiring in the Grill reference do not remain in contact with the

dielectric material, the Examiner holds the position that a portion of the sidewalls remain in contact with the dielectric material, as shown by the remaining portion of the dielectric 200, which is in contact with the sidewall of the conductive wiring, in Fig. 1F (column 5, lines 54-58). The claim language does not preclude a portion of the sidewalls being covered by the dielectric material. It is suggested that Applicant refer to the specification, [0028] to incorporate language into the independent claim such as the sidewalls remain "encapsulated in first dielectric material" or that the interconnects "are not exposed during etchback", to more distinctly define the invention. However, even assuming arguendo that this language is inserted to overcome the Gill reference, another reference, Buchwalter et al. (US 6,184,121), cited in the previous Office Action, as cited prior art of record, shows clearly that the sidewalls of the conductive wiring 60/70 is encapsulated by the dielectric layer (Fig.4A). Clearly, the details of the method by which the dielectric is etched is necessary to include in the independent claim.

11. In response to Applicant's remarks, pages 5-6, regarding the drawbacks and problem recognition in the Grill reference, the Examiner takes the position that these issues are not precluded in the claim language. Grill shows the method, regardless of these issues.

12. In response to Applicant's remarks, pages 6-7, regarding the cap being formed on the conductive interconnect, the Examiner takes the position that the structure in Grill (and Buchwalter) could be formed by forming a protective layer over the conductive interconnect while etching the dielectric, although not shown.

13. In response to Applicant's remarks, page 7, regarding the conductive interconnect having a top portion with a lateral extent greater than that of lower portions of the interconnect, thereby masking areas of the first dielectric material, the Examiner takes the position that the structure in

Grill (and Buchwalter), having the trench/line portion, has a top portion with a lateral extent greater than that of lower portions (the via) of the interconnect, which in turn masks areas of the first dielectric material.

14. Finally, as mentioned previously, clearly, the novelty of the claimed invention lies in the details of the method by which the dielectric is etched (i.e. details concerning patterning the dielectric by using the cap layer). These details are necessary to include in the independent claim.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne A. Gurley whose telephone number is 571-272-1670. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on 571-272-1679. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lynne A. Gurley
Primary Patent Examiner
TC 2800, AU 2812

LAG
June 14, 2004